An ERTS-1 Project

INVESTIGATION OF THE DETECTION & MONITORING OF FOREST INSECT INFESTATIONS IN THE SIERRA NEVADA MOUNTAINS OF CALIFORNIA

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16. Abstract

Activities have included the completion of the field work on ground truth on timber mortality and defoliation; a helicopter overview and ground checking of delineated areas from ERTS-1 color composites, of tree mortality and defoliated areas; repeat aerial photos of sample areas in color and color IR at a scale of 1/5,000; completion of photo interpretation of defoliated areas; No ERTS-1 imagery for June 1973 has been received to date. U-2, A-1 coverage was completed on June 29, 1973, but copies of this imagery has not been received. A casual review of this U-2 imagery at NASA-AMES has shown it to be of excellent quality and resolution.

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Figure 2. Technical Report Standard Title Page

INTRODUCTION

This progress report covers the period of June 1 through July 31, 1973 for the investigation of the Detection and Monitoring of Forest Insect Infestations in the Sierra Nevada Mountains of California through the use of ERTS-1 imagery with support by U-2 and conventional aerial photography, Contract NAS5-21770. Effective date of June 21, 1972.

Activities during this period have included the completion of the field work on ground truth; a helicopter overview and ground checking of designated areas from ERTS-1 imagery of mortality and defoliated areas; repeat aerial photo coverage by our sub-contractor, Earth Satellite Corporation, of the same sample areas which were photographed about one year ago at a scale of 1/5,000; and completion of photo interpretation of defoliated areas from our ERTS-1, NASA supplied color composites made from bands 4, 5 and 7, #1055-18055 for the Yosemite scene taken on September 16, 1972.

Our ERTS-1, June 1973 imagery has not been received to date. U-2 A-1 imagery was flown on June 29, 1973 but copies of this has also not been received to date.

The Author participated in a Field Seminar by the Pacific Southwest Forest and Range Experiment Station, U.S. Forest Service on Insect Problems in Yosemite National Park on July 26, 1973 and reported on the "Detection & Monitoring of Forest Insect Infestations in Yosemite National Park Through the Use of ERTS-1 Imagery with U-2 Underflight and Conventional Aerial Photography."

GROUND TRUTH

Six additional mortality field plots were sampled during this period, which completes the field phase of the study. Dr. Thomas Koeber, our Cooperator from the U.S. Forest Service resampled all of the needle miner defoliated areas to assess the degree of foliage damage, and these data are now being analyzed.

HELICOPTER OVERVIEW

Our cooperators from the U. S. Forest Service, Dr. Koeber and Robert Gustafson, made a helicopter flight over the target area to check particularly on the extent of needle miner defoliation and to verify areas designated as defoliated from ERTS-1 imagery. It was found that there was a very high degree of agreement in the accuracy of the photo interpretation and visual observation from the helicopter flight.

GROUND CHECKING OF ERTS-1 IMAGERY

With our target area relatively free of snow in July we had our first opportunity to field check ERTS-1 imagery for various features delineated earlier on enlarged color composite photographs. We confirmed that the following features had been accurately designated; timbered vs non-timbered areas; damaged vs undamaged timber areas; pure lodgepole pine vs mountain hemlock, western white pine and red fir mixture; lakes; dome shadows, which resemble lakes; mountain meadows; pasture foothill land; agricultural land; desert; and riparian vegetation. Three other features not previously designated included; sage brush-bitterbrush vegetation type; pure Jeffrey pine; and pinyon pine.

UNDERFLIGHT SUPPORT

Repeat aerial photos of sample areas at a scale of 1/5,000 were taken and processed by Earth Satellite Corporation in late July 1973 and a casual review of these shows that there has been major changes in the needle miner defoliated areas, but little change in the mortality areas.

U-2, A-1 photo coverage with color IR was completed on June 29, 1973. The author had a casual review of the processed film at NASA-AMES and was favorably impressed with the quality and resolution of this imagery. We expect this imagery, when copies are received, to be particularly useful in accurately delineating areas of mortality damage and areas defoliated, by degree of damage and degree of defoliation.

SIGNIFICANT RESULTS

In our earlier reports we have indicated that it is possible to delineate areas of lodgepole pine timber mortality into three degrees of damage; light, medium and heavy from enlarged color composite ERTS-1 imagery. During this reporting period we can confidantly report that it is now possible to detect all major areas of lodgepole pine defoliated by the needle miner within our target area. From a casual review of recent U-2, A-1 imagery and repeat 1/5,000 color IR photos we would expect to be able to detect at least two degrees of defoliation from our June 1973 ERTS-1 imagery when received.

We have confirmed, through ground checking and helicopter observations, that our previous designation of the following features have been consistently accurate: timbered vs non-timbered areas; damaged vs undamaged timber areas;

lakes; dome shadows which resemble lakes; mountain meadows; pasture land; agricultural land; desert; and riparian vegetation.

Respectfully submitted,

NATURAL RESOURCES MANAGEMENT CORPORATION

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